UNITED STATES PATENT AND TRADEMARK OFFICE

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10/765,813	01/27/2004	Lakshmanan Ramakrishnan	15142US02	2449

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ART UNIT	PAPER NUMBER
2483	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/765,813	RAMAKRISHNAN, LAKSHMANAN
	Examiner	Art Unit	
	DAVID N. WERNER	2483	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>23 March 2011</u>.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>9-12,20,21 and 23</u> is/are pending in the application.
     4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) <u>9-12,20,21 and 23</u> is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on <u>24 December 2007</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
     a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
     Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1.   This Office action for U.S. Patent Application no. 10/765,813 is responsive to the Request for Reconsideration filed 23 March 2011, in reply to the Non-Final Rejection of 23 November 2011. Claims 9–12, 20–21, and 23 are pending[1].

2.   In the previous Office action, Claims 9–12, 20, 21, and 23 were rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent Application no. 2002/0080870 A1 ("Piazza") in view of U.S. Patent Application Publication no. 2002/0174305 A1 ("Vartti") and in view of U.S. Patent no. 5,414,468 A ("Lee").

Response to Arguments

3.   Applicant's arguments filed with respect to Claims 9, 12, 20, and 23[2] have been fully considered but they are not persuasive. Applicant argues that the claimed processing on units of macroblock rows "produces unexpected results" over "the combination of Piazza and Vartti" by guaranteeing that a "variable length decoder "can always start decoding the macroblock row, and consequently, each macroblock in the row", since in the MPEG-2 standard, a slice always starts with a new symbol for a variable length decoder, whereas a macroblock does not. Thus, according to the Applicant, this unexpected result of synchronization with an

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[1] Applicant states in page 2 that "claim 23 is added", but Claim 23 was already added in the 12 October 2010 Request for Continued Examination.
[2] Applicant at page 2 cites a rejection of "Claims 9, 20, and 23", and requests at page 4 "withdrawal of the rejection to claims 9, 12, and claim 23".

MPEG-2 variable length decoder is 'evidence of the non-obviousness of adding 'macroblock rows' to Piazza and Vartti, notwithstandin [*sic*] the teachings of Lee". However, it is precisely because of "the teachings of Lee" that the claimed invention is not patentable over the prior art as a whole.

The facts of the present case are similar to that in <u>Ex parte Obiaya</u>, 227 U.S.P.Q. 58, 60 (B.P.A.I. 1985). <u>Obiaya</u> was an appeal from an examiner rejection under 35 U.S.C. § 103 over a combination of references in an application for a combustible fuel and oxygen sensor. <u>Obiaya</u>, 227 U.S.P.Q. at 58, 60. The appellant made two arguments before the Board concerning the obviousness rejection: that each of the references was deficient in teaching at least one claimed feature, and that the use of a "labyrinth heater" in the sensor produced an unexpected benefit of a shorter response time. <u>Id.</u> at 60. The Board dismissed the attack on the individual references, explaining that since the requirement of obviousness under § 103 "is not the express suggestion of the claimed invention in any or all of the references, but what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them." <u>Id.</u> The Board held that the combination of references "to obtain the expected additive results" was proper. <u>Id.</u> The Board also found the unexpected result argument unpersuasive. <u>Id.</u> Noting that the prior art references taught the claimed labyrinth heater, and that the references indicated an advantage of using labyrinth heaters, the Board concluded that "[the] fact that appellant has recognized another advantage which

would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious." Id.

As the Obiaya appellant argued that the labyrinth heater produced an unexpected result of a benefit not disclosed in the cited references, Applicant argues that the use of macroblock rows produces an unexpected result notwithstanding the teachings of Lee. However, as mentioned in page 6 of the 23 November 2010 Office action, the Lee reference discloses the claimed use of macroblock rows (slices), and that it discloses a benefit of reduction in a processing bottleneck during entropy decoding as a result of the use of macroblock rows. Applicant's discovery of an additional benefit that is the natural and probable consequence of the application of the Lee macroblock row processing to the combination of the Piazza and Vartti references is not sufficient to form a conclusion of patentability, when the Lee reference already disclosed a sufficient rationale to combine.

In conclusion, Applicant's statement of unexpected results over some, but not all, of the references applied in combination to make an obviousness rejection over 35 U.S.C. § 103 fails to overcome the *prima facie* case of non-patentability set forth in the previous Office action.

Claim Objections

4.   Claim 23 is objected to because of the following informalities[3]: the word "and" should be added to the end of the second from final indentation, and in the final line, the word "engine" is misspelled as "engin". Appropriate correction is required.

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 9–12, 20, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0080870 A1 ("Piazza") in view of U.S. Patent Application Publication No. 2002/0174305 A1 ("Vartti") and in view of U.S. Patent No. 5,414,468 A ("Lee").

Piazza teaches a video decoder with motion compensation. Regarding Claim 9, Figure 8 of Piazza illustrates a block diagram of the decoder. Included is memory 830 storing compressed macroblock 880. Piazza, ¶ 0065. The compressed macroblock is then loaded into cache memory 810. Id. at ¶ 0066. Cache memory 810 is the claimed "local buffer". Processor 800 then processes the data in cache

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[3] Applicant did not acknowledge this objection in the 23 March 2011 *Remarks* nor file an amendment that would overcome this objection.

memory 810 and performs decoding operations such as inverse DCT. Id. at ¶ 0067.

Then, Processor 800 is the claimed "decompression engine". However, the present

invention differs from Piazza in two factors. First, the present invention discloses

an extractor for direct memory access engine control of the local buffer, giving

instructions that the compressed data stored in the buffer may be overwritten by

more compressed video data, not disclosed in Piazza. Second, the present invention

is directed to a processor having a local buffer that stores "a macroblock row"

whereas cache memory 810 in Piazza only appears to store a single macroblock.

First, regarding the claimed extractor, it is respectfully submitted that Vartti

discloses this limitation, and it would have been obvious to one having ordinary

skill in the art at the time of the present invention to modify the Piazza decoder to

include the claimed extractor taught by Vartti.

Vartti teaches a system for controlling cache memory. Regarding Claim 9,

figure 3 illustrates a flowchart of the memory locking process. At step 300, a

processor requests a "storage lock" on a cache line. Vartti, ¶ 0049. The lock grants

the processor the exclusive access to the cache line so that no other processor or

memory unit may access it. Id. at ¶ 0005. This exclusivity includes a right to

exclude other processors or memory units from overwriting the line. Id. at ¶¶ 0045,

0037. The ownership may additionally be a read-only type, in which the owner may

read the line, but no other requester may access the line at all. Id. at ¶ 0043. As

applied to the present invention, when the decompression engine locks the buffer

that stores the "portion", the buffer cannot be overwritten by another component of the decoder.

At step 302 of <u>Vartti</u>, the system determines if the requested cache line is owned by another requester or if it is clear for the current requester. <u>Vartti</u> at ¶ 0049. If the cache line is clear or if the current requester already owns the line, the request from step 300 is granted at step 306. <u>Id.</u> at ¶ 0050. The processor is then free to use the data in the cache subject to the conditions of the ownership, such as read-only. <u>Id.</u> at ¶ 0051. As applied to the present invention, the processing required during ownership is decompressing the data portion stored in the buffer. After the processor is finished using the data, it issues a "release lock notification" at step 308. <u>Id.</u> This release lock notification is the claimed "indicator" allowing further processing of the cache data, such as overwriting. Figure 1 illustrates the computing system of <u>Vartti</u> as a whole as a massively parallel or distributed environment, and figure 2 illustrates an example of one processing module. <u>Id.</u> at ¶ 0024. Included in the processing module is an instruction processor 202 that performs the actual processing operations, cache 206, and storage controller 204 that interfaces between the processor and the cache. <u>Id.</u> at ¶ 0025. Then, the cache 206 is the claimed "local buffer", processor 202 is the claimed "decompression engine", and controller 204 is the claimed "extractor".

<u>Piazza</u> discloses a majority of the claimed invention except for determining when it is "safe" to overwrite a buffer memory. <u>Vartti</u> teaches that it was known to

"lock" a cache memory to allow one processor to read its contents as needed and no other component of a system to access it during the time the memory is locked. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to modify the cache memory of Piazza to be lockable when the processor is decoding the data stored within, as in the cache memory of Vartti, since Vartti states in paragraph 0004 that such a modification would prevent processing errors from inconsistent or incoherent data that changes during processing.

Second, regarding the size of the buffer as storing "a macroblock row", it is respectfully submitted that Lee discloses this limitation, and it would have been obvious to one having ordinary skill in the art to modify the Piazza decoder further to include a macroblock-row-sized buffer.

Lee teaches a video decoder. Regarding Claim 9, in Lee, fig. 1 illustrates the decoder, including buffer system 400. Included in buffer 400 is frame buffer 410, slice buffer 420, and macroblock buffer 430. Since the technical term in the art for a "macroblock row" or "row of macroblocks" is a slice, the "slice buffer" 420 of Lee is considered to store a macroblock row, as claimed. The Lee decoder performs variable-length decoding of video data one slice at a time, storing the partially-decoded slices in a buffer before fully decoding their coefficient data. Lee, col. 4: lines 36–44. This is the claimed process of decoding compressed video data stored in the macroblock row local buffer.

Piazza, in combination with Vartti, discloses the claimed invention except for a macroblock-row sized local buffer. Lee teaches that it was known in the art at the time of the present invention to use a macroblock row, or slice, buffer to store partially-decoded video data for full decoding. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the present invention to modify the system of Piazza to use a macroblock-row sized buffer, as taught by Lee, since Lee states in col. 1: line 38–col. 2: line 18 that such a modification would eliminate a processing bottleneck at entropy decoding macroblock row units of data.

Regarding Claim 10, in Piazza, a macroblock command to data stored in cache memory 810 is the claimed command. Piazza, ¶ 0087.

Regarding Claim 11, in Lee, assuming only one slice is in slice buffer 420 at once, a second slice after the first slice is processed and stored in the slice buffer 420 is the claimed "another portion of the compressed video data".

Regarding Claim 12, as previously mentioned, figure 1 of Vartti illustrates a parallel embodiment with multiple caches and processors.

Regarding Independent Claim 20, as discussed above, in Piazza, processor 800 is the claimed video decoder and cache 810, as scaled up to hold a slice or macroblock row, is the claimed local buffer. In Vartti, interface 204 between the

processor and the cache incorporates the claimed extractor and direct memory access engine.

Regarding Claim 21, <u>Piazza</u> is expressly described as a system "for motion compensation of digital video data". <u>Piazza</u>, abstract.

Regarding Independent Claim 23, in <u>Piazza</u>, fig. 2 illustrates a block diagram of the decoder. Variable length decoding module 210 is the claimed variable length decoder. Slice buffer 420 of <u>Lee</u> is the claimed "compressed data buffer". Inverse quantization unit 230, inverse DCT unit 240, and motion compensation unit 200 form the claimed decompression engine. In <u>Lee</u>, variable length decoding is described as performed per slice, or macroblock row, to use the claim language. <u>Lee</u>, col. 4: lines 37–43.

Conclusion

7.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory

action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID N. WERNER whose telephone number is (571)272-9662. The examiner can normally be reached on Monday-Saturday from 10:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph G. Ustaris can be reached on (571) 272-7383. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the

automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-

272-1000.

/D. N. W./
Examiner, Art Unit 2483

/Dave Czekaj/
Primary Examiner, Art Unit 2483